SECTION V
TERRESTRIAL AND RIPARIAN ECOSYSTEM

MAPS REFERENCED

SECTION V
TERRESTRIAL AND RIPARIAN ECOSYSTEM

V.1 - VEGETATION

REFERENCE CONDITIONS

ANALYTIC QUESTION V.1.1

What riparian and terrestrial forest stands represent reference conditions?

Riparian Forest Reference Stands

Comparison of historic and recent aerial photography and riparian inventory data indicate at least four discrete riparian communities are represented in the watershed.

1. Steel Creek - A mixed hardwood/conifer overstory, dominated by big-leaf maple constituted the historic Steel Creek riparian community. This community was maintained by chronic, natural, slope disturbance. Reference sites for this community are located along the Steel Creek mainstem in T27S, R10W, Section 31. Although no reference stands currently exist on Elk Creek, it is believed that the reference stand type found in Steel Creek would apply to Elk Creek.

2. Camas, Lausch, Lost, and Dead Horse Creeks - The Camas Creek riparian community had a mixed conifer overstory and midstory, practically devoid of hardwoods. The conifer species were western hemlock, Port-Orford-cedar, western red cedar, Douglas fir, and Pacific yew, in order of predominance. Stand conditions were maintained by fire. Reference sites for these communities are located along Camas Creek mainstem and Lausch Creek, T28S, R09W, Section 23 and T28S, R09W, Section 13, respectively.

3. Brummit Creek - Here, the riparian community had a mixed conifer overstory, with incidental hardwoods. The distribution of hardwoods (red alder, big-leaf maple, and to a lesser extent, myrtle) was patchy. Their occurrence was strongly associated with periodic mass wasting, especially debris torrents. Reference sites for this community are in T27S, R10W, Section 23 - NW¼.

4. Riparian communities in the remaining drainages and mainstem East Fork below Brewster Gorge, were composed of mixed conifer/hardwood stands, with conifer as the majority. The hardwood component was primarily big-leaf maple and myrtle. A reference site for these communities can be found in T28S, R11W, Section 13 - NE¼.

Terrestrial Forest Reference Stands

The historic landscape was characterized by large, heterogeneous stands containing similar-aged patches (ranging in age from 0 to 500+ years old) (Ripple 1994). The patches could contain scattered old-growth trees (i.e., remnant trees >160 yrs. old), as individuals and patches, and small patches of assorted younger age classes. At any one time, a particular sub-watershed could be dominated by one seral stage, but still contain scattered young and old stands.

The oldest remaining naturally-developed stands are concentrated in the Brummit Creek subwatershed. Brewster Canyon, Camas Creek, and Upper East Fork Coquille subwatersheds also contain older naturally-developed stands. Younger stands ≥ 120 years old, naturally-developed after fires in the mid-1800s, exist throughout the watershed. All variations within the douglas-fir community are represented in these stands. These reference stands can be used as models for management prescriptions in LSRs, factoring in such components such as elevation, aspect, species mix, and proximity to the stand to be managed.

ANALYSIS QUESTION V.1.2

What effects have past disturbances had on terrestrial and riparian vegetation communities?

Natural disturbances affecting vegetation can be tied back to extreme weather (extreme drought, strong winds, and high intensity storms) and fire. Human disturbances include agricultural development, road and utility corridors, and timber harvest. These disturbances cause stand replacement or modification ranging from small patches to extensive areas. See Section III.7 for more information on disturbance processes.

Ripple (1994) indicated that 61% of all Coast Range coniferous forests were in old growth condition prior to widespread fires in the late 1840s. The fires, thought to be set by early white settlers, burned approximately 35% of the Coast Range (Teensma *et al.* 1991) leaving 43% of the forests in old growth condition.

No studies have been conducted in the watershed to identify the exact acreage of old growth prior to Euro-American settlement. However, we can determine that currently approximately 4% of the watershed has been cleared for agriculture or utility corridors and 78% has been burned or harvested and is now ≤ 80 years.

CURRENT CONDITIONS

ANALYSIS QUESTION V.1.3

What is the composition of plant communities?

The analysis area is in the western hemlock (*Tsuga heterophylla*) zone (Franklin and Dyrness 1969). Both the hemlock series and the Port-Orford-cedar (*Chamaecyparis lawsoniana*) variant of the hemlock series are common in this part of the hemlock zone. Timber sale cruise data of merchantable and unmerchantable trees shows Port-Orford-cedar comprising ≥10% of trees in stands in the southern half of the analysis area. Port-Orford-cedar north of the East Fork Coquille River comprises <1% of the stand.

Douglas-fir / Hardwood

Minor variations in species composition exist. The differentiation appears to correlate more with geomorphology and elevation than with subwatersheds. The most noticeable variation is the amount and species composition of hardwoods, which may comprise up to 30% of the stand.

Generally, stands above 1,800' elevation (located in R08W & R09W, also see Map A.11) tend to be primarily composed of conifer species with hardwood occupying ≥10% of the stand. Madrone and chinkapin are the primary hardwood species. Natural regeneration of conifer (Douglas fir and hemlock) is common in the eastern portion of the analysis area above 2,000'. Below 1,800', alders (and a few big leaf maples) are widespread on northerly aspects, disturbed sites, poorly reforested areas, and near streams. The northern extent of tanoak occurs just north of the watershed. Tanoak distribution at its northern extent is strongly correlated with the inland extent of marine influence.

Red alder is an aggressive species, quickly dominating areas following soil disturbance from logging, road construction, or landslides. The percentage of alder in the stand increases to the west. In the Brummit Creek subwatershed, the range of alder (mostly as a result of disturbance) extends to higher elevations. Myrtle and big leaf maple are present, but comprise only 2-3% of the stand. Madrone, chinkapin, and tanoak are mostly limited to south aspects and ridges.

Grand fir comprises ≥10% of the conifer component inside R11W (the area including Elk Creek, Lower East Fork , and the western portion of Brewster Canyon subwatersheds). Incense cedar makes a trace appearance within R08W, the extreme eastern part of the analysis area. Douglas-fir composition in the watershed varies widely. The oldest stands (i.e., 1580 or 1700 birthdate) contain 25-60% Douglas-fir with the remainder being hemlock and trace hardwoods. Younger stands (i.e., mid-late 1800's birthdate) contain 50-90% Douglas-fir.

ANALYSIS QUESTION V.1.4

What are the age-class distributions of overstory vegetation?

Current forest age class locations are displayed on Map A.19, (in Appendix A). Acreage of these classes is presented in Table V.1 and the relative ownership extent is summarized Figure V.1.

Table V.1
Current Forest Age Class Distribution

FOREST AGE CLASS	BLM		COQUILLE FOREST		PRIVATE		% OF TOTAL
	ACRES	% OF BLM	ACRES	% OF CIT	ACRES	% OF PVT.	
Ag./ Power Line ROW	308	< 1	0	0	3,406	9	**4**
0 - 40	20,091	34	413	30	24,722	63	**53**
41 - 80	6,848	15	162	12	10,578	27	**21**
81 - 120	3,876	9	653	48	264	1	**6**
121 - 160	3,517	8	138	10	0	0	**4**
161 - 200	348	1	0	0	0	0	**< 1**
201 +	10,436	23	0	0	0	0	**12**
Total Acres	**45,424**		**1,366**		**38,970**		**100**

GIS data, describing forest age class, size, and density (Forest Operations Inventory, FOI), is available for BLM and Coquille Tribal lands. Birth date information for older stands (>80 years) is often over-generalized, because such stands may include trees of varying ages. Still, FOI offers the best available picture of forest condition. FOI information for young stands, particularly those <40 years old, is more accurate. Data for private lands is interpreted from aerial photography and is less accurate.

Fifty two percent of the forested area is comprised of young stands (≤40 years of age). 'Pole-timber' (41-80 years) and late-successional forests (>80 years) each make up 22% of the forested area. Old growth forests (201+ years) comprise 12% of the late-successional forests. Age class distribution on all federal lands mirrors that in the Reserve areas.

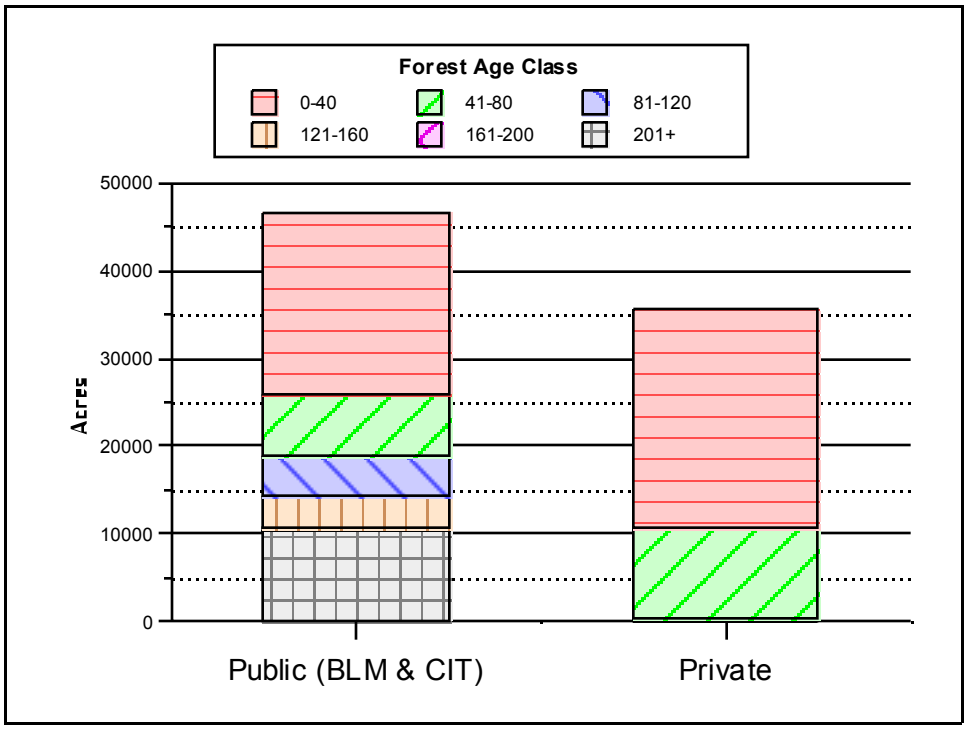

Figure V.1. Current forest Age Class distribution by ownership.

ANALYSIS QUESTION V.1.5

How do abiotic physical attributes of land affect the development and maintenance of riparian vegetation?

Riparian zones with higher disturbance frequencies (landslides, debris flows, etc.) Will have vegetation primarily in earlier successional stages. These areas will be dominated primarily by red alder. Areas with frequent disturbances are directly linked with geology and soils. Riparian zones with lower disturbance frequency will be dominated by those species (bigleaf maple, myrtle, western red cedar, Port-Orford-cedar, and other conifers) less adapted to frequent disturbances.

ANALYSIS QUESTION V.1.6

How do the prominent natural and human-caused disturbance processes influence the pattern of riparian plant communities over time?

Natural processes will affect communities as described in Sections IV.1 and V.2. On Federal lands, human-caused disturbances in riparian areas (such as road building) will only occur on a

very limited basis. Likewise, following NWFP criteria will result in timber harvest in riparian areas when commensurate with habitat restoration objectives.

ANALYTIC QUESTION V.1.7

Is there adequate potential for recruitment of down wood to streams and riparian areas?

Natural conifer stands begin to recruit LWD in desired quantity and dimensions at 150 years of age (Spies *et al.* 1988). Therefore, potential for recruitment of LWD may be approximated by the proportion of the riparian area that is over 150 years of age. Figure V.2 shows the age-class distributions of BLM Riparian Reserves within the analysis area, and Figure V.3 portrays this information for each of the six subwatersheds. Presently, 22% of the Riparian Reserves are of sufficient age to contribute appreciably to LWD recruitment. This value varies from 5-42% across individual subwatersheds. With the exception of the Brewster Canyon subwatershed, all of the riparian age-class distributions are either bimodal or skewed, with a preponderance of 0-40 year old stands.

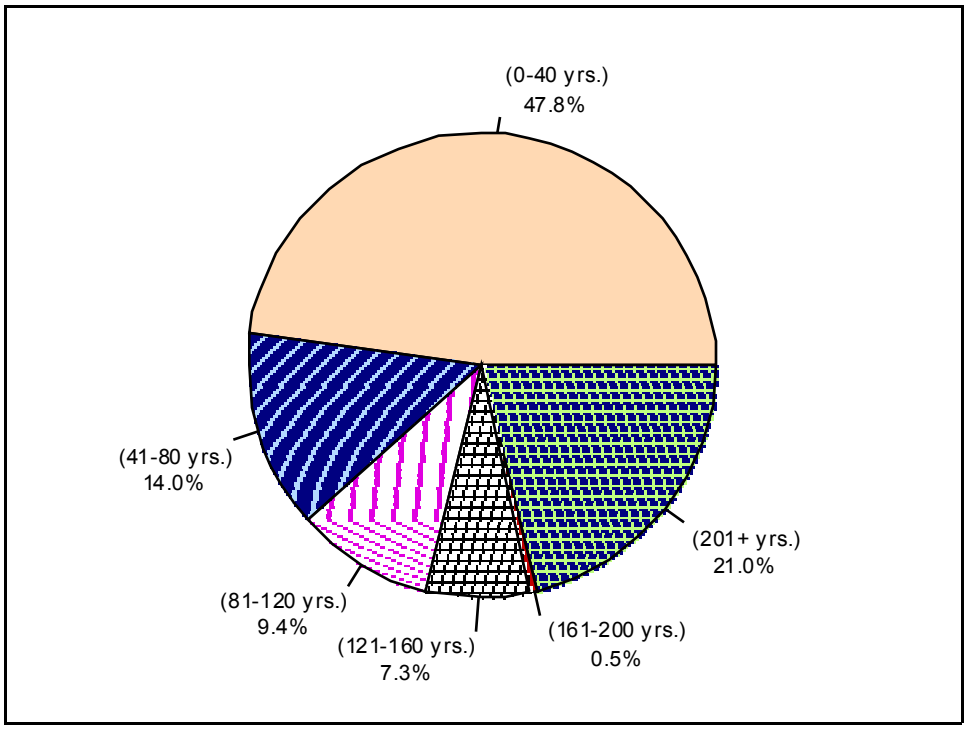

Figure V.2. Current Riparian Reserve forest Age Class distribution.

Nearly all BLM-managed, 0-40 year old stands within the analysis area are the result of harvesting of stands that were >120 years old. It can be presumed that LWD recruitment

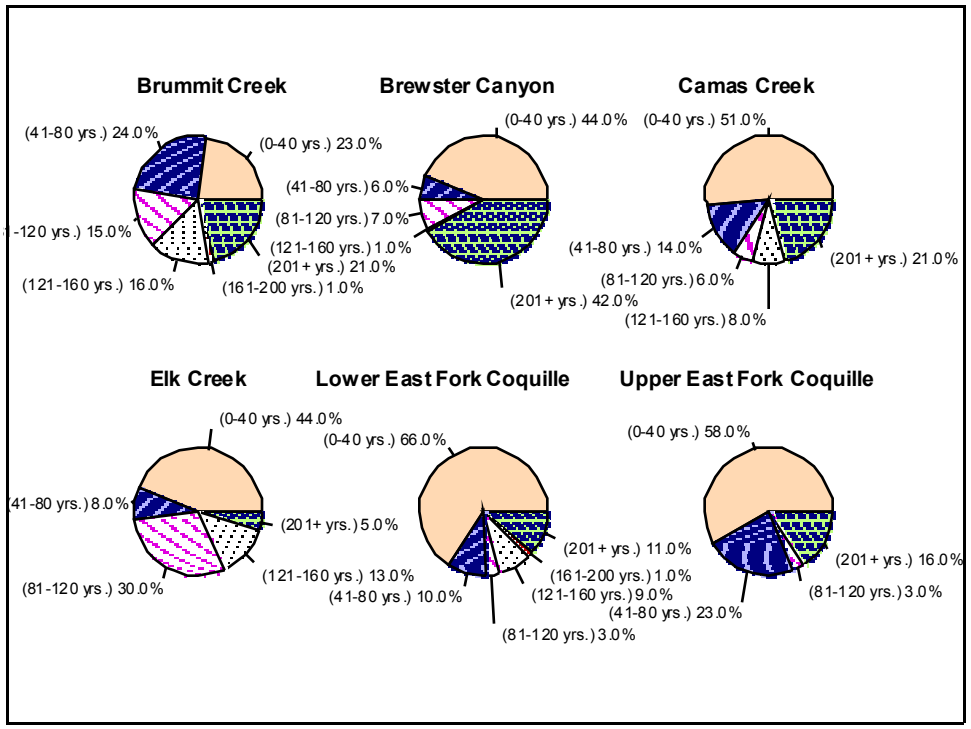

Figure V.3. Current subwatershed Riparian Reserve forest Age Class distribution.

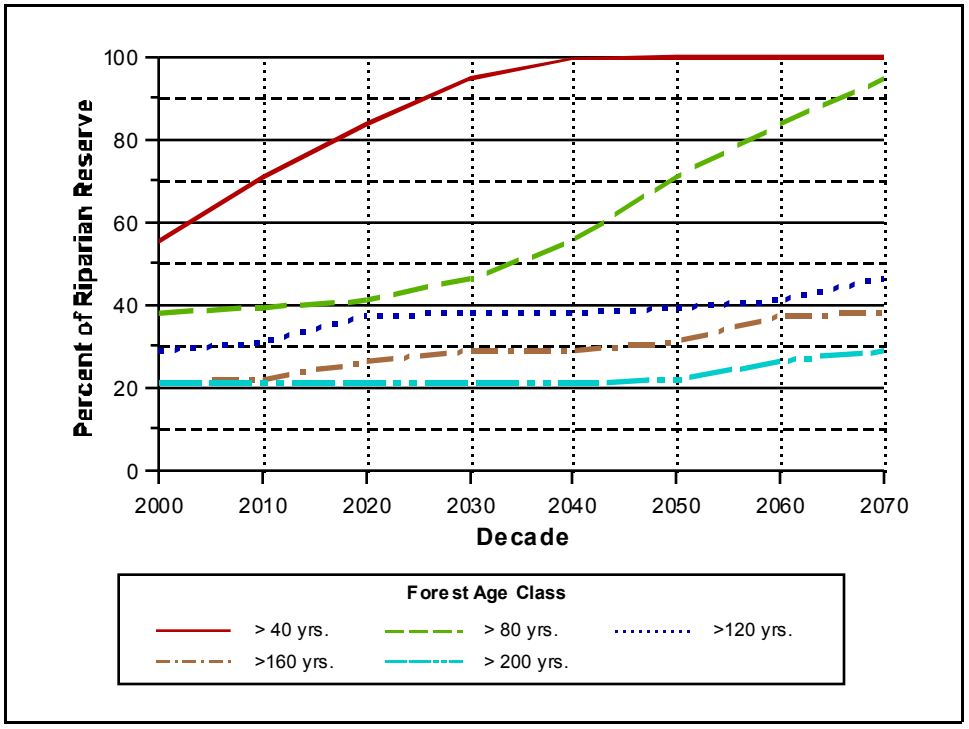

Figure V.4. Projected forest Age Class development in Riparian Reserves.

potential on BLM-managed lands is presently less than 50% of historical levels. As depicted in FigureV.4, the LWD recruitment potential is projected to nearly double over the next 70

years, provided that Riparian Reserve boundaries are maintained. The greatest improvements in LWD recruitment potential are expected in the Elk Creek subwatershed

SYNTHESIS AND INTERPRETATION

ANALYSIS QUESTION V.1.8

What is the trend for the general vegetative communities?

With ≥79% of BLM lands in a 'Reserve' land allocation and an additional three percent being managed at a 150 year rotation, plant communities associated with late-successional forests will be well represented throughout the analysis area over time. Eventually, most reserve areas will be in late-successional forest condition.

Age class projections show a steady increase in the amount of 80+ year old stands each decade until 2078, when all Reserve areas reach this age class (see Figure V.5). Acreage in stands ≤40 years of age decreases steadily until the year 2038 when all stands in Reserve areas are at least 40+ years old. No additional stands enter the 201+ year old age class until 2018. A small portion of reserve areas may be affected by varying intensities of natural and forest management disturbances.

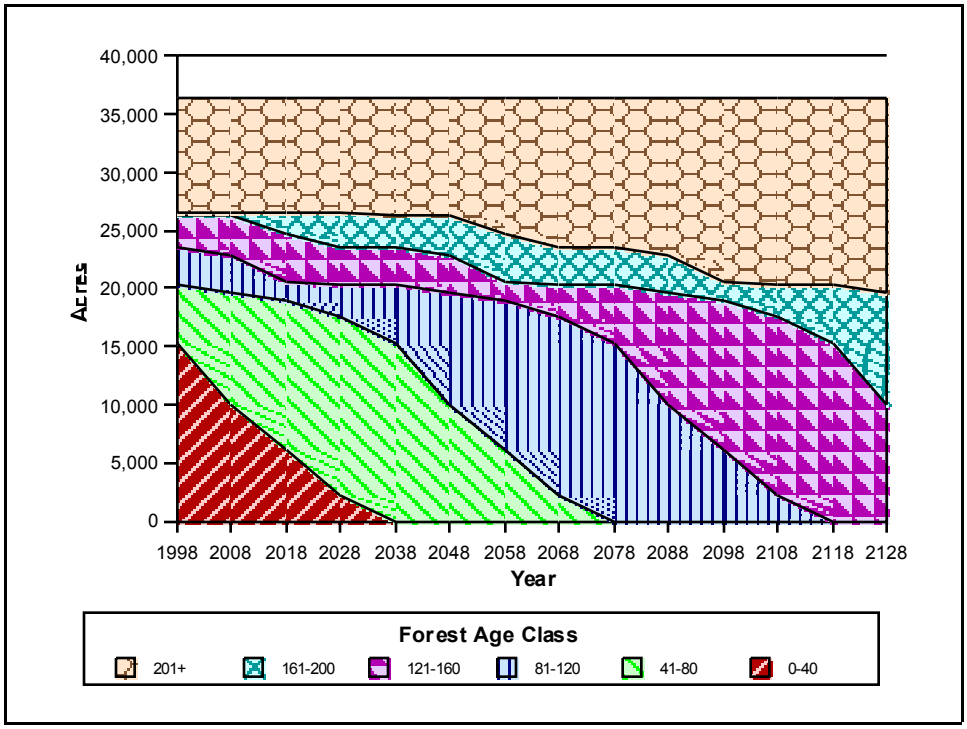

Figure V.5. Projected forest Age Class development on all reserve lands (Riparian Reserves and LSR).

Private lands and those BLM managed lands designated as GFMA are expected to be maintained as 40-80 year old stands, depending upon ownership and timber market conditions. If private lands are managed on 60 year rotations, age classes may be fairly evenly split between 0-20, 21-40, and 41-60 year age classes. Coquille Forest lands will be managed consistent with the Northwest Forest Plan and may maintain age class distributions similar to BLM-administered land.

ANALYSIS QUESTION V.1.9

What are the trends of altered riparian plant communities and seral stages?

Management activities have proliferated younger stands and early-seral plant communities in riparian zones (see Figure V.2). In addition, ground disturbance from road construction and logging (to a lesser extent) has resulted in hardwood-dominated (red alder) Riparian Reserves. Riparian zones have naturally higher disturbance rates than uplands, and a greater propensity for red alder and other early seral species. However, management activities have exaggerated their relative abundance. Even with natural seeding from adjacent uplands, conifer germination and growth are greatly inhibited by the shading of alder and salmonberry. The riparian stand along the mainstem of West Fork Brummit Creek (in T27S, R10W, Sections 21, 22, 27, and 28) is a good example. Red alder/salmonberry will likely dominate this site, and others like it, for decades by competitive exclusion of conifer and other hardwood species. While dominance of red alder on particularly disturbance-prone riparian areas is appropriate, active management may be necessary to reestablish desired stand conditions elsewhere.

ANALYSIS QUESTION V.1.10

What are the influences and relationships between vegetation and other ecosystem processes?

The affects of natural and human disturbance processes on riparian and terrestrial vegetation are described in Section III.9.

ANALYSIS QUESTION V.1.11

What are the management objectives for riparian vegetation on Federal lands?

All riparian vegetation on federal lands is in Riparian Reserves. The objective for these reserves is to maintain or create habitat supporting late-successional, riparian, and aquatic species. This means meeting the ODFW (1997) criteria for "good" habitat, with respect to shade, on all stream reaches, as verified by aquatic habitat or riparian surveys.

For lowland riparian areas, maintain or restore historic vegetation assemblages and conditions to the extent possible. Lowland riparian areas (Rosgen type C & F channels) would have a mixed hardwood stand, with scattered conifers, extending to the edge of the floodplain and flood prone terraces. The understory would include native shrubs and herbaceous species. The vegetation would form a canopy over the stream channel with ≥60% crown closure on the East Fork Coquille River and >70% crown closure on tributaries. This condition would restore natural hydrologic function, provide bank stability, enhance water quality and fish habitat, and support beaver and other wildlife species. The forthcoming WQMP will further refine these objectives.

For upland riparian sites (Rosgen type Aa+, A, & B channels), maintain >70% canopy cover over streams. Manage for mature (>160 years) stands dominated by conifer with scattered hardwoods in the overstory, as in the reference sites noted above. The understory would include a mixture of native shrub species, varying with site conditions. Riparian Reserve widths would conform to those specified in the ROD, or as modified after a Riparian Reserve Evaluation. This condition would restore the natural sediment budget, hydrologic function, provide a source of large woody debris, enhance water quality and fish habitat, and support wildlife species. On private lands, the riparian buffer widths would follow the State Forest Practice Rules (ODFW 1997).

ANALYSIS QUESTION V.1.12

What are the management objectives for terrestrial vegetation on Federal lands?

The objective is to maintain vegetative diversity at the genetic, species, and community levels. Genetic diversity refers to the diversity within species. This is important since it is the way species respond to their surrounding environmental conditions over time. Species diversity refers to richness and composition within communities. While a high species richness is considered a desirable objective, in reality what we believe may be more important is the species composition. For example, an area dominated by numerous exotic, and annual species may have a high species richness, but may be less desirable than a community with a lower species richness composed of native species. Species composition is also dependent on scale as some species may require specific habitats. Community diversity refers to maintaining native plant communities and structural complexity across the landscape. Maintaining forest in all successional stages and non-forest plant communities will increase diversity across the landscape. Within forested communities the objectives should be to retain and promote increased structural complexity. Plans for future forest activities should consider potential impacts to these species and include a way to create habitat features that benefit these species.

It is not likely that historic vegetative patterns can be restored, primarily due to the fire suppression policy. Matrix lands will be managed for timber production and early to mature seral stages. The application of Standards and Guides will retain some key structural components (snags, down logs, species mixes, landscape patterns, etc.) and attempt to mimic

the results of natural disturbances. These objectives may also provide some benefit for mid- and late-seral species. Silvicultural practices (pre-commercial thinning, commercial thinning, release treatments, fertilization, and hardwood and brushfield conversion) promote stand vigor. For reserve land use allocations, it is desirable to strive towards late-successional forests with old-growth characteristics where site conditions are conducive. Prescriptions for silvicultural practices in upland reserves should be based on appropriate reference sites.

ANALYSIS QUESTION V.1.13

Where can hardwood/brushfield conversions be performed?

Hardwood/brushfield conversion is most appropriate in stands where past management (failed or inadequate reforestation efforts) has altered species composition from conifer to a hardwood/brush dominated site. Those sites that do not have conifer potential should not be converted. FOI identified 1,268 ac as hardwood, and 32 ac as brushfield conversion opportunities (Appendix A - Map A.20). On a landscape scale, this is a small percentage of the land-base and could be harvested / converted as opportunities are presented. However, most of the hardwood acres lie within the LSR network; see Analysis Question V.2.11.

V.2 - TERRESTRIAL AND RIPARIAN HABITAT

CURRENT CONDITIONS

ANALYSIS QUESTION V.2.1

What are the key habitats, where are they located, and what processes affect them?

Key habitats are those that are important for species of management concern or relatively rare on the landscape, such as seeps and springs, rocky outcrops/cliffs, and meadows. These habitats increase biodiversity across the landscape, because species composition in them differs from the surrounding forest.

Late-successional/Old-Growth Forest

Several species of concern are old-growth dependant. LSRs and other reserves are expected to provide old-growth habitat for associated species in the long-term and to serve as sources for repopulating adjacent areas as suitable habitat develops. However, many reserve areas do not currently contain late-successional forests. Table V.1 indicates that 41% of BLM lands contain stands >80 years of age, which includes 23% that are >200 years of age. On private land, cursory aerial photo interpretation suggests that nearly all forests (99%) are <80 years of age. Private land is primarily managed for timber production or livestock grazing and likely will never provide substantial late-successional or old growth habitat. Eventually, old-growth

habitat will be located only on BLM and Coquille Forest reserve lands. Additional late-successional habitat (80-150 years old) will exist within Connectivity areas.

Riparian Areas

These habitats are important for a wide variety of plant and animal species (FEMAT 1993). They are located adjacent to stream channels, wetlands, seeps and springs. A distinct microclimate, and typically the presence of hardwoods, provide habitat for species not associated with the surrounding forest. Many riparian-dependent species spend all, or a critical portion (e.g., reproductive stage) of their life cycle, in riparian areas. These habitats also provide excellent corridors for dispersal of riparian and terrestrial species.

Riparian areas are shaped by disturbance processes characteristic of uplands (such as fire and windthrow), as well as by processes unique to riparian habitats (such as channel erosion, peak flow, and sediment deposition from floods and debris flows). Riparian areas influence the exchange of nutrients and materials from adjacent upland forests and provide the link between terrestrial and aquatic ecosystems. Riparian vegetation is particularly important for many riparian-dependant species and the source of LWD needed for many aquatic species.

Seeps and Springs

Seeps and springs typically occur at the interface between two soil layers that have different permeability rates, where one impedes the passage of water into the other. This situation can occur between geologic formations as well as within and between soil types. In the analysis area these interfaces occur between soil types on upper and midslopes. In these areas one soil type will infiltrate between 2-6 in. water/hr. whereas a soil type just below will only accept 0.6-2 in. water/hr. A seep or spring will form where a disturbance occurs that exposes the lower impervious soil. Disturbances often occur when roads are built or trees blow over. These areas have different microclimatic conditions (moisture, relative humidity, temperature, etc.) from the surrounding forest and support a different suite of plant and animal species. For example, some species of mollusks and bryophytes only occur within these areas.

Springs and seeps can occur from the headwalls of drainages (where past slippage of the soil has occurred) to the edge of the streambank (where water is allowed to escape to the stream from groundwater pore pressure). To map all these locations at once is being undertaken in connection with other surveys conducted prior to ground disturbing activities. Vegetation associated with a high water table largely is responsible for maintaining the characteristics and habitat values associated with spring and seeps.

Rocky Outcrops

Rocky outcrops, cliffs, and talus are important for a unique suite of species, like cliff nesters, reptiles, and succulent plants. Adjacent vegetation, topography, geology, and streams create the unique microclimates these sites provide for wildlife and vegetation. These areas are susceptible to microclimate changes associated with activities adjacent to these habitats.

Large rocky outcrops include those in the China Wall ACEC and Brewster Rock area as well as several smaller areas in the Brewster Canyon subwatershed. Many additional rock outcrops occur throughout the analysis area, and these are identified on the TPCC GIS theme. These

areas contain cracks, protected ledges, shallow caves, interstitial spaces, overhangs, or cavities that provide habitat for many species.

Meadows

Natural meadows are relatively rare in the analysis area. The only meadows of substantial size are those located within the China Wall ACEC. These meadows are areas where the soil layer is too thin and dry to support most woody vegetation. Secondary plant succession may, in some cases, be reducing the size of these habitats through shading. Periodic disturbances, such as fire, maintain these meadows over time.

ANALYSIS QUESTION V.2.2

What are the key habitat components?

Key habitat components include: vegetative complexity, late-successional forest, landscape patterns (including roads), microclimate, and snags and down logs. These components are an integral part of habitats used by species of concern.

Refer to Section V.1 for a description of historical and current stand conditions, including age-class distributions. Further discussion will focus on the special habitats and key habitat components listed above.

ANALYSIS QUESTION V.2.3

What are the current condition, pattern and distribution of key habitat components?

The analysis area landscape generally is characterized by hard edges (distinct contrast between adjacent stands) and small patch sizes (±40 ac), especially in the western portion of the watershed. Managed stands are even-aged, homogenous, and contain few remnant trees. Some areas contain relatively few snags and down logs, because of past snag falling contracts and salvage activities. Across the landscape, early seral habitats are more common than late-seral habitats. From a landscape perspective, the land is a fine-grained, hard-edged, rapidly-changing mosaic.

Vegetative Complexity

Vegetative complexity includes species, age class, and structural diversity (e.g., a multi-storied stand of mixed conifer and hardwoods with remnants). Increased vegetative complexity accommodates a wider faunal diversity to maintain well-distributed populations. This complexity varies in scale, ranging from the multi-layered canopies of late-successional and old-growth forests to micro-sites inhabited by rare species. Systematic forest inventories have not been conducted in the analysis area to evaluate the abundance and distribution of key

vegetative and structural forest components. As a result, only a general analysis of forest complexity and its effects on species can be presented.

The majority of the analysis area (70%) supports second growth plantations (≤60 years old). Traditional logging methods, site preparation, regeneration, and stand maintenance do not necessarily mimic the disturbance processes that maintained this landscape prior to Euro-American settlement. The result is a simplified landscape with respect to vegetation and structure. Late-successional and old-growth forest patches are found almost exclusively on BLM-administered lands. From a habitat perspective, these stands have a more complex structure and higher vegetative diversity than their younger counterparts. For example, the canopies have greater volume and complexity than the single-storied, uniform canopies typical of many plantations. Complex stands support a greater abundance and diversity of arboreal species which forage, roost, or reproduce in the canopies. Small patch size may limit the habitat value for some species by increasing the edge-to-area ratio (Matlack 1994).

Microclimate

Microclimate is the set of environmental conditions (moisture, relative humidity, soil and air temperature, radiation, etc.) which surround key habitat components. These conditions greatly influence whether these components are suitable for their dependent species. In relatively undisturbed areas (late-successional/old-growth stands) the microclimatic conditions are less extreme and facilitate species utilization. Microclimate is directly impacted by factors such as percent canopy cover, slope, aspect, season, and proximity to stand edges.

Snag/Down Log Habitat

In Oregon Coast Range forests, snag and down log abundance is highest in stands which regenerated naturally after a fire. Forty to eighty year-old stands generally have decreased amounts of snags and down logs. This is because trees in the regenerating forest are too small to contribute (Spies *et al.* 1988). Decay Class 1 and 2 wood and remnant snags are in advanced stages of decay. Table V.2 shows mean numbers of large snags and down logs found by Spies *et al.* (1988) in the Coast Range.

Table V.2
Average Snags/Acre and Volume Down Logs/Acre (All Decay Classes)* in Naturally Regenerated Stands in the Coast Range.**

STAND AGE	SNAGS/ACRE (>20" DIA. & 16' TALL[1])		VOLUME DOWN LOGS/ACRE (FT^3/AC.)[2]		RIPARIAN AREAS VOLUME DOWN LOGS/ACRE (FT^3/AC.)	
	#	RANGE	VOL.	RANGE	VOL.	RANGE
40-70 yrs old	1.6	0 - 3.2	1,101	514 - 1,615	—	—
80-120 yrs old	2.8	0.4 - 5.3	1,730	757 - 2,701	6,531	643 - 12,419
200-525 yrs old	4.0	2.4 - 5.7	3,260	2,372 - 4,144	11,504	4,244 - 18,764

* [± 2 standard errors]

** (Adapted from Spies et al. 1988, Ursitti 1991)

1 Minimum retention levels for snags equate to approximately 40% (theoretically) of levels found in natural stands.

2 The minimum down log retention levels for hard logs (decay class 1 and 2) from the RMP equates to 167 ft^3/ac (approximately 5-15% of what is found in natural stands). Divide ft^3/ac by 1.39626 to get the number of feet of 16 inch diameter log necessary to equal the given volume.

There is believed to be a shortage of snags in younger stands because of past harvest, salvage, and snag falling contracts. LWD volume will vary based on disturbance history. Recent inventories in younger stands in an adjacent watershed (Tioga Creek) indicate that LWD volumes may exceed those in old-growth stands (USDI 1999). BLM snag and down log inventories are currently being conducted. It is important that all decay classes are represented in a stand, since each decay class supports a different suite of species. There appears to be a definite succession of many fungi (Trappe and Luoma 1992) and bryophyte (Soderstrom 1988) species occurring on different decay class logs.

Landscape Pattern

Evaluation of landscape patterns usually incorporates degree of fragmentation, edge effects, available refugia, and connectivity (Noss and Cooperrider 1994). The remaining late-successional habitat in the analysis area is highly fragmented. The substantial blocks of interior forest habitat are in LSR 261 (see Appendix A - Map A.21). Late-successional habitat which connects across ridge tops can provide connectivity (migration or movement corridors) to adjacent drainages and subwatersheds. There are two developing late-successional habitat connections between 5th field watersheds (see Appendix A - Map A.22).

Edge effects are modified environmental conditions along the margins of different plant communities. The edge effects between patches need to be considered in evaluating landscape patterns. The depth of edge influence (the environmental transition zone between adjacent stands) can vary depending on aspect, slope, difference in age classes between adjacent stands, and the orientation of edge face (Harris 1984, Chen and Franklin 1990, Chen *et al.* 1992). Different environmental variables have different sensitivities to edge effects. Air temperature, relative humidity, and wind speed have a depth of edge influence between 120 and 180 meters, while the influence of soil temperature and moisture is between 60 and 120 meters (Chen and Franklin 1990).

In forest stands, the depth of edge influence is greatest between recently harvested clear-cut units and late-successional/old-growth stands. The depth of edge influence decreases as the adjacent younger stand canopy approaches the lowest portion of the older forest canopy.

Edge effects may also indirectly impact habitats in other ways. For example, standing snags near an edge may be more susceptible to blow down and down logs near a south-facing edge may dry out during the summer thus making this substrate unsuitable for those species (mollusks, amphibians, bryophytes, etc) that utilize it.

Refugia function as centers for repopulation of adjacent habitats. Well-distributed refugia are critical for conservation of species such as small mammals, invertebrates, and amphibians with limited mobility and small home ranges. The paucity of refugia make them more crucial to managed than to un-managed forest landscapes.

Connectivity Blocks

The analysis area contains nearly 3,000 ac. of Connectivity (CONN) land use allocation (see Table III.1). Of this acreage, 52% (1,551 ac.) are in Riparian Reserves. These blocks are situated between LSR 261 to the north and LSR 259 to the southeast (see Map A.4) and were intended to function as islands of habitat linking the two LSRs. Analysis of habitat and function includes CONN lands that overlap the Big Creek subwatershed, which is in the adjoining Middle Fork Coquille Watershed (see Map A.1b).

CONN blocks are managed on a 150 year rotation to retain 25-30 % in late-successional habitat. Presently, blocks 1, 3, and 5 contain 59%, 19%, and 41%, respectively, of their area in the >80 year age class. In addition, these blocks are managed to eventually contain four to five different age groups or habitat classifications. Old growth (201+ year age class) would only occur in Riparian Reserve areas of the CONN Blocks (Figure V.6).

ANALYSIS QUESTION V.2.4

What is the boundary of the riparian plant community, and what factors determine this boundary?

The riparian plant community boundary is associated with increased soil moisture throughout the growing season, a result of high water tables. This increase in moisture affects the microclimate within this zone, for example, air and soil temperatures are typically cooler and relative humidity is higher. Channel types also influence the width of the riparian plant community. For example, C types have wider riparian areas due to the adjacent wide flood-prone area. The boundary of the riparian plant community is within the boundaries of Riparian Reserves.

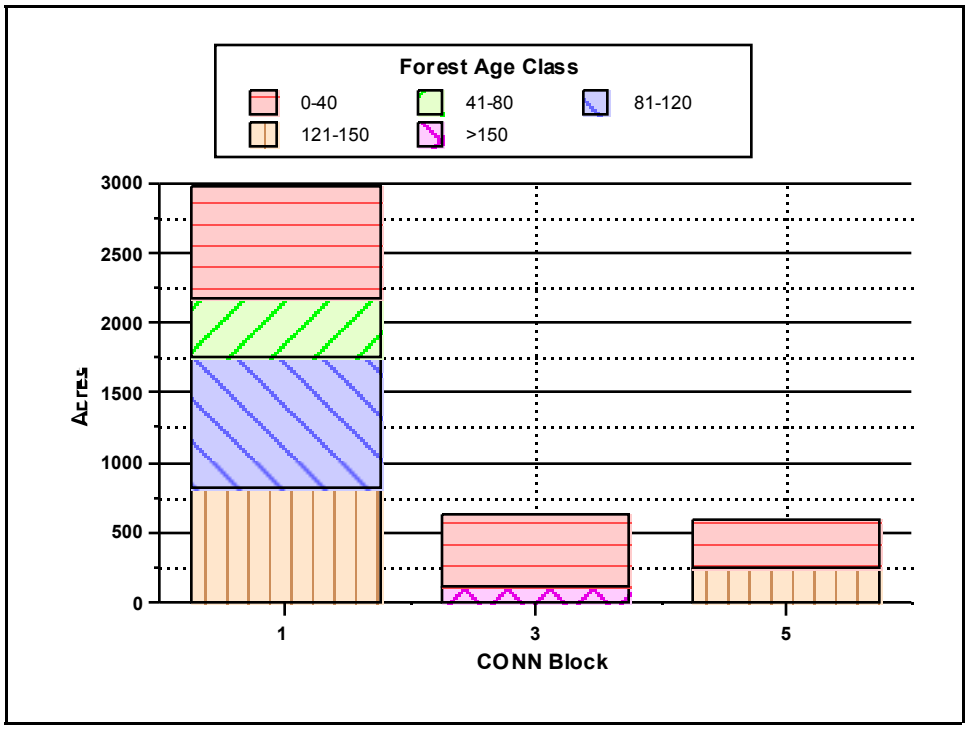

Figure V.6. CONN Block forest Age Class distribution.

ANALYSIS QUESTION V.2.5

How has timber harvest under the Rescission Act affected the function of the LSR?

The 1995 Rescission Act timber sales (TS91-27, Chaney Road and TS90-21, Twin Horse) removed a total of 92 ac of late-successional habitat from LSR #261. A District-wide Plan Evaluation (USDI 1998) assessed impacts of Rescission Act timber sales on the LSR network and the NFP. This evaluation (USDI 1998:21) found that:

> ... the difference between the effects of the Rescission Act ... sales as harvested and the effects of these sales as analyzed in the FSEIS and anticipated in the ROD is not sufficient to alter the validity of the decisions in the RMP....

Similarly, in a REO review of Rescission Act sales (REO 1997), the REO determined that the capacity of the regional reserve network to provide the Federal contribution to the recovery of NSO and marbled murrelet remains intact.

The LSR contains 10,935 ac of late-successional habitat (23% of the total federal land ownership). The removal of 92 ac from a regional and District-wide perspective was not critical. However, on a local scale, the Chaney Road sale did reduce the interior habitat within T29S, R10W, Section 9. In addition, this sale removed potential nesting habitat in the vicinity of a known bald eagle nest.

ANALYSIS QUESTION V.2.6

Does the watershed meet the minimum 15% Standard and Guideline retention requirement?

The "15%" calculation is to be conducted on a 5th field watershed scale and include late-successional stands, patches, and fragments larger than 2½ ac. In the analysis area, the RMP 15% retention requirement equates to 7,022 ac that must be maintained in late-successional condition. Currently, there are 19,240 ac of federally-administered late-successional forests in the watershed (Table V.3). Of these, 16,102 ac (34%) are located in "Reserve" designated lands (i.e., LSR, MMRs, Riparian Reserve, and others). Consequently, the objective of retaining the 15% minimum will be met through this Reserve network. Harvest of ≅700 ac on GFMA and CONN lands is planned for fiscal years 2000-2002. Furthermore, harvesting of all operable acres would not reduce the watershed to near or below the 15% threshold.

Table V.3
Late-Successional Habitat Acreage

LAND ALLOCATION	FOREST AGE CLASS					
	80 - 119 YRS.	%[2]	120- 179 YRS.	%[2]	180+ YRS.	%[2]
LSR & MM Reserves	1,700	4	1,604	3	7,631	16
Riparian Reserves[1]	1,013	2	911	2	927	2
Other Withdrawals	321	2	314	<1	1,326	3
CONN	306	<1	223	<1	44	<1
GFMA	500	1	599	1	673	1
Coquille Forest GFMA	654	1	138	<1	0	0
Coq. For. Rip. Reserves	287	1	69	<1	0	0
Totals	**4,781**	**10**	**3,858**	**8**	**10,601**	**22**

[1] This figure represents Riparian Reserves acres within the GFMA & CONN land use allocations.
[2] Federal land totals 46,790 ac. in the analysis area.

SYNTHESIS AND INTERPRETATION

ANALYSIS QUESTION V.2.7

How have management activities affected special habitats?

Seeps and Springs

Past management activities (predominately harvest) have changed microclimates associated with forest seeps and springs by exposing these habitats to greater extremes in temperature (Noss and Cooperrider 1994). Removal of adjacent vegetation that previously transpired large quantities of water results in higher ground level moisture that can influence the site for up to 40 years. These changes most likely have altered the vegetative composition.

Rocky Outcrops

With few exceptions, rock outcrops have not been physically changed from past management activities. However, activities such as timber harvest have changed microclimates associated with these habitats, thus reducing their suitability for some dependent species. Additionally the removal of vegetation has set these areas back to a stage that allows for re-colonization.

Meadows

The result of fire suppression is reduced meadow size due to woody vegetation encroachment. Aerial photos of meadows has shown a steady decline in the size of these habitats over decades. As woody vegetation encroaches these habitats, the soil properties and species composition change. Only those meadows that are a result of thin soils, which prevent woody vegetation, have remained relatively constant. These habitats generally occur on south-facing aspects which are more prone to periodic disturbances. The introduction of exotic plant species has also impacted meadow plant communities by changing species composition.

ANALYSIS QUESTION V.2.8

How have management activities affected the condition, pattern and distribution of key habitat components?

Vegetative Complexity

The landscape patterns of Oregon coastal forests have changed over the last century, affecting associated plant and animal habitats (Ripple 1994). Forest management converted large interconnected patches of late-successional forest to young, managed plantations. Managed plantations have much lower vegetative diversity and structural complexity than unmanaged forests. For example, even-aged plantations typically are dense, and contain more evenly spaced trees than do unmanaged forests. Plantations have closed, uniform canopies with few gaps. Because of harvest and replanting regimes, trees in even-aged plantations tend to be uniform in diameter, age and height (Spies and Franklin 1991), and trees or snags from the previous stand are scarce or absent.

Natural disturbances to unmanaged forests occasionally result in dense uniform stands, but these may retain a great deal of variability and habitat complexity (depending on the site and intensity of the disturbance). On private land, only small, isolated patches of late-successional forest remain. Intensive forestry practices and short rotations that maximize yields discourage vegetative diversity and structurally complex forest habitats.

Late-successional Forest Habitat and Function

The analysis area reserve network contains 36,396 ac [LSR #261, TPCC, owl and murrelet sites, Riparian Reserves, etc.] which are intended to provide long-term late-successional habitat. The region-wide LSR network is designed to accommodate the long-term needs of these late-successional forest-associated species. However, analysis at the subwatershed scale is appropriate to ensure habitat for species with limited mobility and to accommodate dispersal of late-successional wildlife species between LSRs. Harvest of late-successional habitats will continue in Matrix before similar habitat characteristics (broken and decayed trees, down logs, snags, etc.) have fully developed throughout the reserve network. The result is a short-term decrease of late-successional habitats until reserves develop.

Only 12% of the analysis area contains stands >200 years of age. Substantial forest acreage will not enter the 201+ year age class for 50 more years (see Figure V.5). Nearly all existing old growth habitat is in Reserves and will not be harvested.

Microclimate

Past management has exposed certain key habitat components (snags and down logs) to environmental extremes (temperature fluctuations and moisture loss). This has directly affected the microclimate of these components, reducing their habitat suitability. Increased fragmentation, which leads to an increase in edge effects, indirectly affects these same components in adjacent stands within the depth of edge influence. These actions have altered key habitat components, leaving suitable microclimates primarily in older age classes.

Snags and Down Logs

Snag and down log abundance is believed to have declined dramatically over the last 50 years (Spies *et al*. 1988). Snag and down log abundance on private lands is likely to remain low. Although snag and down log abundance will be greater on BLM lands, it is likely to remain lower than on equivalent-aged unmanaged lands. According to Spies *et al.* (1988), down log retention levels on Matrix lands are approximately 10-30% of the levels found in unmanaged stands. Snag retention is expected to roughly approximate that found in unmanaged stands of similar age (see Table V.2). One critical function of reserve areas is that they will eventually contain snag and down log habitat consistent with unmanaged stands.

Snags

Current snag abundance is believed to be below the 40% level on most managed BLM lands. Field surveys are in progress and are expected to be available for subsequent project-level NEPA analysis. The Snag Recruitment Simulator model (Marcot 1991) suggests that approximately two hard snags per acre (11" or greater DBH and distributed throughout the landscape) are necessary in order to provide sufficient hard snags in the present and soft snags in the future (see USDI 1997c, Appendix C, Table C-6). The model further suggests critical snag shortages in the near future unless additional snags are created through management. According to Cline *et al.* (1980), it takes up to 50 years for a hard snag to become a soft snag (decay class 3+) making near-term shortages of soft snags unavoidable.

Location of snags is important. A variety of decay classes, topographic positions, seral stages, and distributions (i.e., singly, small and large clumps) need to be provided through time. Past

harvest practices left most wildlife trees on the edges of harvest units, which limited options for creating snags in a variety of topographic positions.

The Coos Bay District RMP (USDI 1995a) directs that at a minimum, adequate numbers of snags be retained to support cavity nesting species at 40% of potential population levels throughout the Matrix. It is possible to hasten the attainment of the 40% population goal on Matrix lands by aggressive snag creation efforts. Snag abundance is also believed to be low on reserve lands; this condition also will persist without aggressive snag creation efforts. Even if this goal is achieved on BLM land, actual cavity nester populations in the watershed will likely be lower, due to the lack of snags on adjacent private lands.

Down Logs

Current down log abundance is believed to be below unmanaged levels on BLM lands. Future recruitment of down logs may be limited by the low numbers of snags and green trees retained throughout the area, which often fall as they age.

Although the District RMP establishes interim guidelines for down log retention within regeneration harvest units, these guidelines are considered a minimum. More accurate models are being developed to establish specific down log retention levels for groups of plant associations or stand types. In units harvested using minimum retention requirements, down log volumes likely would be lower than the average for naturally regenerated forests, because some class 3 to 5 down logs inevitably are destroyed during the logging process.

Landscape Pattern

Fragmentation is a threat to species with large home ranges, such as the American marten or northern spotted owl. Many existing old forest patches are too small to support successful reproduction. Further fragmentation of late-successional habitat will continue to reduce patch size and create edges, thereby reducing the effectiveness of remaining interior habitat. Most late-successional forest patches can support one or more reproducing pairs of species with small home ranges.

Three factors determine the effective size of late-successional patches; 1) actual size, 2) distance between similar habitats, and 3) degree of habitat difference of intervening forest matrix (Harris 1984). Patch size also has a major influence on key physical and biological conditions which affect habitat suitability. For example, some bat species select roost sites with very specific habitat characteristics that are well protected from variations in temperature and humidity. These conditions can be found in interior portions of large late-successional forest blocks. Within small patches, environmental conditions are more variable and strongly influenced by adjacent habitats.

Landscapes dominated by edge habitats favor generalist species at the expense of those dependent on interior habitat and microclimate. Some bird species may experience higher failure rates due to predation and nest parasitism when nesting on edges (see Noss and Cooperrider 1994 for a discussion).

For now, protecting remaining refugia sites is critical to maintain populations of late-successional species, and facilitate re-colonization of recovering habitats. Based on the existing age class distribution, four decades of growth will be needed for late-seral stands to attain the vegetative and structural complexity of functional old-growth habitat. See Section V.1 (Figure V.5) for projected future age class distribution on reserve lands.

Connectivity

Connections between habitat areas are especially important in fragmented landscapes. Habitat connections occur at two scales: connections between large LSRs to facilitate movements of fairly mobile species, and connections between habitat patches to facilitate movements of less mobile species.

In the long-term, connections between large LSRs should be accommodated by other reserve and withdrawn areas. CONN blocks, with additional standards and guidelines, are intended to facilitate dispersal of mobile late-successional species across the landscape.

Existing 40+ age stands on Matrix land can reinforce habitat connections for the next 40 years until the Reserves mature (Appendix A - Map A.23). Given the management objectives for the Matrix, deferring harvest everywhere for 40 years is unlikely. Therefore, emphasis should be to defer harvest as long as possible in stands that contribute most to connectivity. Priority for harvest deferral should be given to those stands which connect to adjacent subwatersheds or to larger more contiguous stands.

Riparian Reserves on intermittent streams are particularly important for maintaining connections between habitat patches. They often connect upland and riparian habitats, and together with perennial stream reserves, form continuous corridors through BLM lands. Even though 55% of Riparian Reserves are >40 years of age, their current fragmentation limits connectivity (see Analysis Question V.1.7, and Figure V.2).

Road Density

The current road density for the analysis area averages 4.11 mi/mi^2. The density of roads on BLM lands is slightly lower at 3.93 mi/mi^2. The open road density is currently 3.65 mi/mi^2. The maximum open road density cited in the RMP is 2.90 mi/mi^2. More information on roads can be found in Section VI.3.

Roads increase access for legal or illegal hunting and vehicle traffic can harass wildlife. Negative effects are particularly well documented for large mammals such as elk (Wisdom *et al.* 1986). Cole *et al.* (1997) noted vehicle traffic on secondary roads was greatest during fall hunting seasons. Even short, dead-end spur roads received an average of 171 vehicle trips/month during hunting season. A telemetry study of elk on a portion of the Coos Bay District (Cole *et al.* 1997) found they avoid areas within 164' of roads and poaching accounted for 50% of the elk mortality.

Studies suggest some wildlife species, particularly small mammals and invertebrates, seldom cross roads - even roads closed to vehicles (Noss and Cooperrider 1994). However, roads can also provide a travel path into interior habitat for edge associated species. Gated roads which

still receive significant administrative use, or gates left open, also do little to reduce harassment to wildlife. Minimizing new road construction, decreasing open road density through decommissioning, and revegetation decreases wildlife disturbance and barriers.

ANALYSIS QUESTION V.2.9

How does the LSR function in the larger LSR network?

A portion of LSR 261 occurs in the watershed. This LSR provides the only link between the Siskiyou and Siuslaw complexes. Refer to *The South Coast- Northern Klamath Late-Successional Reserve Assessment, May 1998* (USDA and USDI 1998) for further details.

ANALYSIS QUESTION V.2.10

What are management objectives for improving the function of connectivity on Federal lands?

1. Generally decrease fragmentation and edge contrast. The following guidelines can be used where practical:
   - Concentrate harvest units in space and time.
   - Use green tree retention or harvest prescriptions to feather edges of harvest units to soften the transition across edges.
   - Maintain diversity of canopy species and understory shrubs, including hardwoods, in thinning units.

2. Maintain microclimate features of important special habitat areas such as seeps, springs, meadows, and rocky habitats.

3. Maintain high quality late-successional habitat scattered throughout the watershed via the Reserve network.

ANALYSIS QUESTION V.2.11

How are potential density management areas within the LSR determined?

Treatments are targeted for stands aged 25-79 years-old and are a subset of the listed priorities in the Late-Successional Reserve Assessment [LSRA] (USDA and USDI 1998:68). Stands younger than 25 years-old will be maintained, released, or pre-commercially thinned according to the priority set forward in the LSRA. The priority for management of stands >25 years-old in the East Fork basin are discussed in the LSRA under the sections for maintenance

(p. 79), stand conversion (p. 85 & 86), or density management (p. 80). When funding is available, the priority for management would be:

1. ensure the survival of existing conifer which are under severe competition from alder (and other hardwoods) [**release**],
2. establish conifer where there currently is none [**conversion**],
3. thin overstocked stands to promote growth and accelerate the development of late successional habitat characteristics [**density management**].

Because different activities are funded from different sources, and additional LSR objectives (road density, riparian silviculture, etc.) factor into overall management objectives, it is probable that multiple activities would occur simultaneously. For example, not all release activities need to be completed prior to conducting density management or conversion. Additionally, the costs for stand maintenance (i.e. timber stand improvements) and conversion in these age classes are usually high and not revenue producing. Some of the treatments would be unique in their application with a moderate to high risk for not meeting their objectives. At present, there is no readily available source of funds for treating these stands.

Stand selection

Potential management areas were identified from a GIS map and aerial photography, then categorized based upon the priorities above. The categories are:

Category 1: Areas that require **release** treatments in order to maintain the existing conifer component. The LSRA states that "mixed [conifer-hardwood] stands with 40-50 well spaced, established, free to grow conifer may be on an acceptable trajectory" (USDA and USDI 1998:86). Category 1 stands were initially selected based on visual observation and will require a field survey to determine whether they will meet the desired trees per acre (TPA).

Category 2: Areas that need hardwood **conversion** from red alder to a conifer stand. Some stands were previously identified in FOI and some were from visual field observation. These stands will also require a systematic field survey to determine whether they will meet the desired 40-50 TPA count.

Category 3: Conifer stands that are overstocked and require some level of **density management**. Areas within LSRs/MMRs were selected based on stand age and guidance from the LSRA. The selection criteria was: areas within a ½ mi. radius of a spotted owl site that are below the 40% habitat threshold core, and also between 30-39 years of age. Areas outside of the ½ mi. radius were FOI units which ranged from 35-79 years of age.

Ages were based on the year 2000, since it is unlikely activity would occur prior to that Fiscal Year. Administratively withdrawn areas were not included in the analysis [Timber Production Capability Classification (TPCC) lands, occupied NSO and murrelet sites, etc.]. In order to concentrate on areas economically or physically feasible to harvest, only areas ≥ 5 ac. were mapped. Site-specific stand exams would identify actual tree stocking and appropriate silvicultural prescriptions to obtain the desired stocking level. The resultant management recommendations can be found in Section VIII.

V.3 - SPECIES OF MANAGEMENT CONCERN

CURRENT CONDITIONS

ANALYSIS QUESTION V.3.1

What species of management concern are known or suspected to be present and what are their habitat needs?

Species of management concern include federal and state threatened and endangered species, BLM sensitive species, and survey and manage/protection buffer species (USDI 1995a). The management regime prescribed by the Northwest Forest Plan is expected to have a high probability of maintaining well distributed viable populations of these species. Table V.4 below includes these species, and other species of local concern. These species of local concern are listed below along with a brief description of the reason for their inclusion. Only species with a potential to be found in the analysis area were considered. An exhaustive list of all species occurring on the Coos Bay District can be found in the Big Creek Watershed Analysis (USDI 1997c) Appendix C - Table C-1.

Table V.4
Wildlife Species Of Concern

SPECIES	GROUP	STATUS	K/S	COMMENTS
Threatened and Endangered Species				
Bald Eagle	bird	FT	K	
Marbled Murrelet	bird	FT	K	
Northern Spotted Owl	bird	FT	K	
Peregrine Falcon	bird	FT	K	
BLM Sensitive Species				
Foothill Yellow-legged Frog	amphibian	BS	K	
Northern Goshawk	bird	BS	K	
Pileated Woodpecker	bird	BT	K	
Purple Martin	bird	BS	S	
White-footed Vole	mammal	BS	S	
Cimicifuga elata	plant	BS	S	
Erythronium revolutum	plant	BT	S	
Euonymous occidentalis	plant	BT	K	
Iliamna latibracteata	plant	BA	S	
Pellaea andromedifolia	plant	BA	S	
Phacelia verna	plant	BT	K	
Romanzoffia thompsonii	plant	BS	S	
Sidalcea cusickii	plant	BT	K	
Survey and Manage/Protection Buffer Species				
Del Norte Salamander	amphibian	C1/2	S	
Big Brown Bat	bat	PB	K	

SPECIES	GROUP	STATUS	K/S	COMMENTS
California Myotis	bat	PB	S	
Fringed Myotis[1]	bat	PB	K	
Hoary Bat	bat	PB	S	
Little Brown Myotis	bat	PB	S	
Long-eared Myotis[1]	bat	PB	S	
Long-legged Myotis[1]	bat	PB	S	
Pacific Western Big-eared Bat	bat	PB	S	
Silver-haired Bat[1]	bat	PB	S	
Yuma Myotis[1]	bat	PB	K	
Diplophyllum plicatum	bryophyte	C1/2	S	
Kurzia makinoana	bryophyte	C1/2	S	
Red Tree Vole	mammal	C2	S	
Helvella compressa	fungi	C1/3	S	
Otidea leporina	fungi	PB	S	
Otidea onotica	fungi	PB	S	
Otidea smithii	fungi	PB	S	
Sarcosoma mexicana	fungi	C3/PB	S	
Lobaria linita	lichen	C1/2/3	S	
Pseudocyphellaria rainierensis	lichen	C1/2/3	S	
Blue-gray Tail-dropper	mollusk	C1/2	S	
Oregon Megomphix	mollusk	C1/2	S	
Papillose Tail-dropper	mollusk	C1/2	S	
Allotropa virgata	vascular plant	C/1/2	S	
Species of Local Concern				
Dunn's Salamander	amphibian	BT	K	Riparian/talus associate
Southern Torrent Salamander	amphibian	BS	K	Riparian associate
Tailed Frog	amphibian	BS	K	Riparian associate
Band-tailed Pigeon	bird		K	Population declining
Neo-tropical Migratory Birds	bird		K	Habitat degradation and loss
Sharp-shinned Hawk	bird		K	Sensitive to thinnings
Beaver	mammal		K	Riparian associate
Marten	mammal	BT	K	Population declining

[1]Also a Special Status species

Status (Reasons for Inclusion) - Special Status Species (See BLM Policy 6840 for definitions)

FT - Federally listed Threatened
BS- Bureau Sensitive Species
BA - Bureau Assessment
BT - Bureau Tracking
PB - Protection Buffer Species
C1/2/3 -

K/S: K - Known to occur within the analysis area
S - Suspected to occur within the analysis area (suitable habitat present)

Threatened and Endangered Species

Marbled Murrelet

There are at least 16 occupied sites in the analysis area; more are suspected. The key habitat features essential to the conservation of this species are individual trees with potential nesting platforms, forests immediately surrounding these trees, and a landscape with increased amounts of older stands and reduced fragmentation. Typical nesting platforms are moss covered limbs approximately six inches or greater in diameter or platforms provided by brooming that has captured debris.

Peregrine Falcon

There are no known eyries in the analysis area, although a pair of falcons were observed in the vicinity of Dora in 1995. Peregrine falcons nest on sheer cliffs ranging in height from 75-2,000 ft. and prefer sites overlooking open areas, usually with water, where waterbirds are common. Eyries are located at 40-80 percent of total cliff height on sheer faces and are usually inaccessible to mammalian predators. Most eyrie cliffs in Oregon are ¼ to ½ mi. from riparian (including ephemeral streams), lacustrine, or marine habitat, although further distances (up to one mile) have been reported elsewhere.

Population density is most likely limited by nest sites. Depending on the features, anywhere from 100 yards to one mile from nest sites are defended. A home range can be anywhere from 25-100 $mi.^2$ in size.

Northern Spotted Owl

There have been extensive surveys conducted for spotted owls. There are 15 known site centers: two in GFMA, two in CONN, and 11 in Reserve land use allocations. The long-term conservation strategy is to provide suitable nesting, roosting and foraging habitat [stands > 80 years old (see Appendix A - Map A.21)] in the LSRs and younger-aged stands with habitat suitable for spotted owl [defined as forests > 40 years of age (see Appendix A - Map A.23)] between LSRs. The analysis area has been well-surveyed for owls and additional owl sites are unlikely given the marginal condition of habitat outside the LSR and the current distribution of owl sites.

Private land will only marginally contribute to suitable spotted owl nesting, roosting, and foraging habitat given the 40-60 year harvest rotation. At present, 40% of federally-administered land is suitable spotted owl nesting, roosting, and foraging habitat. Loss of suitable habitat and fragmentation is the primary threat to spotted owl populations (Thomas *et al.* 1990).

Approximately 57% of federally-administered land contains habitat suitable for spotted owl dispersal, 78% of which is found in the reserve network. Approximately 44% of the watershed (all ownerships) contains suitable spotted owl dispersal habitat.

Table V.5 presents current and projected dispersal habitat availability. The projected figures incorporate recruitment of habitat in the Reserve designated lands. We also assume regeneration harvest on federally-managed lands (GFMA & CONN) and private lands will provide dispersal habitat in a quantity similar to what they contribute now. Dispersal habitat is projected to increase over the next 40 years and reach equilibrium in 2038 with 90% of BLM-administered land supporting dispersal habitat.

Table V.5
Current and Projected Dispersal Habitat Extent for Northern Spotted Owls

OWNERSHIP	1998		2018		2038	
	ACRES	%OF OWNERSHIP	ACRES	%OF OWNERSHIP	ACRES	% OF OWNERSHIP
Federal Reserves	21,059	45	30,394	65	36,396	78
Matrix (GFMA & CONN)	5,777	12	5,777	12	5,777	12
Total Federal	**26,836**	**57**	**36,171**	**77**	**42,173**	**90**
Private	10,842	28	10,842	28	10,842	28
Total All Ownerships	**37,678**	**44**	**47,013**	**55**	**53,015**	**62**

Even with the gradual reduction of suitable habitat in the GFMA, owl sites will persist and produce young for the short-term. However, the GFMA owl sites are expected to "wink out" and support only occasional occupation thereafter. Conversely, as conditions become suitable in reserve allocations, owl populations should increase.

Bald Eagle

One bald eagle pair was observed nesting in 1991. The nest attempt apparently failed and follow-up surveys indicate the site may have been abandoned. Private landowners above Brewster Gorge have reported seeing eagles, but surveys to date have been inconclusive.

In the Pacific Northwest, bald eagles typically nest in multi-layered, coniferous stands with old-growth trees located within ½ mi. from water (USDI 1986). Suitable habitat is present along the mainstem of the East Fork of the Coquille, but habitat surveys have not been conducted. Availability of suitable trees for nesting and perching is critical for maintaining bald eagle populations. Perch trees typically provide an unobstructed view of the surrounding area and are usually near nests or feeding areas.

The Pacific Northwest is a key area for wintering bald eagles and supports over 25% of the wintering bald eagles in the lower 48 states (USDI 1986). Winter roost sites have a favorable microclimate providing protection from inclement weather. Wintering sites are typically in the vicinity of concentrated food sources such as anadromous fish runs, and high concentrations of waterfowl or mammalian carrion.

Special Status Species

Plants

The key habitat features for special status plants typically are unique areas, such as rock outcrops, meadows, riparian areas, seeps and springs, etc. Any unique habitat has the potential to yield special status plant species, however, the Coast Range of Oregon has relatively few "rare" plant species, most likely due to low habitat diversity (Kaye *et al.* 1997).

Currently, three special status plant species, western wahoo (*Euonymus occidentalis*), spring phacelia (*Phacelia verna*), and Cusick's checker mallow (*Sidalcea cusickii*) are known to occur

within the watershed. Habitat for western wahoo includes shaded streambanks, wet areas in forests (seeps and springs), and riparian areas. This species has been found at one location along Camas Creek. Spring phacelia occurs on open moss-covered rock outcrops and meadows and can be found within the China Wall ACEC. Cusick's checker mallow occurs in open areas, such as rocky balds, usually in heavy soil (Hitchcock *et al.* 1961, Hickman 1993). This species has been found at three locations, also in the Camas Creek subwatershed. At least five other special status species could potentially occur within the watershed.

Surveys have not been conducted for any of these species. Some have a wide geographic distribution but generally occur in small populations while others are restricted to either a narrow range or specific habitat type.

Animals

Bats

Bats are associated with a variety of habitat structures. Buildings, bridges, rock crevices, tree cavities or foliage, and fissured or loose tree bark offer potential roosting crevices. Old growth forests provide higher quality roost sites than younger forests (Christy and West 1993). Foraging areas include the forest and forest openings, riparian areas, and open water.

Voles

White-footed voles are perhaps the rarest rodent in North America (Verts and Carraway 1998). The white-footed vole inhabits riparian areas, particularly along small streams with a mature alder forest component (Maser *et al.* 1981). White-footed voles are susceptible to habitat loss and fragmentation. Projects which reduce mature alder riparian habitat could affect local populations or fragment what is probably an already highly fragmented distribution (see Section VII). It could be important to maintain some alder, even in areas targeted for hardwood conversion. This rare vole has been documented in the Umpqua Resource Area, near Bandon, and further south in the district. Survey efforts for white-footed voles have been largely unsuccessful (e.g., Roseburg BLM 1996 effort). Presently, there is no survey protocol available.

Survey and Manage/Protection Buffer Species

Plants (Including Fungi, Lichens, Bryophytes, and Vascular Plants)

Survey and Manage (Component 1 and/or 2)/Protection Buffer plant species currently are not known in the analysis area. Formal surveys have not been conducted for these species. Many species potentially could occur within the watershed (refer to Table C-3 in the ROD (USDI 1995a) for a list of all Survey and Manage species, pages C-49 to C-61). The species listed in Table V.4 are those which have been located in similar habitats throughout the District. Very little habitat and distribution/abundance data currently exists for most of these species.

- Incidental locations for Component 1 and 2/Protection Buffer fungi species (*Sarcosoma mexicana* and *Helvella compressa*) have been found across the district and in adjacent watersheds, but none are currently known within the analysis area. Key habitat components for fungi are soil, needle duff, decaying wood (saprobes), and the enclosing roots of most vascular plant species (mycorrhizal). Those species that occur in decaying wood appear to have a definite successional pattern based on the level of decomposition.

- Incidental surveys for bryophytes have been conducted in nearby Cherry Creek Research Natural Area (RNA) in Middle Creek subwatershed, and in the Brummit Creek subwatershed. Locations of *Diplophyllum plicatum* (Component 1/2), and *Ulota megalospora* (Protection Buffer) have been discovered at Cherry Creek RNA and in other adjacent watersheds. One location of the liverwort, *Ptilidium californicum* (Component 1/2) has been found in an adjacent watershed.
- Very few surveys have been conducted for lichens, and no Component 1 and/or 2 species have been located. Several locations of other Survey and Manage Component 3 and 4 lichen species (*Lobaria* spp., *Usnea longissima*, *Pseudocyphellaria* spp., *Nephroma* spp.) have been documented in the analysis area while conducting other surveys.
- Lichens and bryophytes occur on a variety of substrates including rock, soil, decaying wood (snags and down wood), and live trees (epiphytes). Epiphytic lichen and bryophyte species require relatively stable substrates such as tree boles and large lateral limbs. Hardwood tree and shrub species also are important in providing suitable substrates for lichens and bryophytes. Multiple layers of vegetation in older forested stands provide more suitable habitats for lichens and bryophytes than homogenous, younger-aged stands.

- No locations of any Survey and Manage vascular plants have been documented, and with the exception of *Allotropa virgata*, this watershed is not within the range of any of these species. *Allotropa virgata* (candystick) often has been referred to as a saprophyte due to its achlorophyllous (non-green) nature. In actuality it is a mycotroph (a plant that obtains necessary nutrients from a mycorrhizal fungus associated with its roots). This fungus is mycorrhizal with a photosynthezing plant (typically Douglas-fir). The candystick may actually be parasitic on the fungus, but it is thought that from this interaction, all three species (Candystick, fungus, and conifer) may benefit (Castellano and Trappe 1985). Candystick occupies well-drained soils, often with abundant down wood (especially Decay Class 4 and 5) within most coniferous and mixed forest vegetation series. It is not restricted to late-successional conditions but its largest populations occur in these older forest habitats.

Mollusks

According to Version 2.0 of the mollusk survey protocol (Furnish *et al.* 1997), three species of terrestrial mollusks will require surveys prior to ground-disturbing activities. These are the blue-grey tail-dropper (*Prophysaon coeruleum*), papillose tail-dropper (*Prophysaon dubium*), and Oregon Megomphix (*Megomphix hemphilli*). No surveys have been conducted for these species within the analysis area. It is highly probable that all three species will be located during upcoming surveys.

Key habitat components for Survey and Manage mollusks varies among species. Suitable habitat for Oregon Megomphix includes moist conifer or conifer/hardwood (bigleaf maple) mixed forests up to 3,000' elevation. Key habitat components for these species are leaf litter; under large bigleaf maples, near down logs and beneath sword ferns.

Habitat for both tail-dropper species includes conifer forests, typically with a hardwood component. The key habitat components for these species are conifer and hardwood logs, ground litter and mosses, and leaf litter under shrubs.

Red Tree Vole

Red tree voles (RTV) are arboreal rodents that occur in patchy distributions primarily in late-successional forests (Huff *et al.* 1992). Red tree voles are most commonly found in Douglas-fir stands, though they are occasionally found in grand fir, Sitka spruce, and western hemlock. They have been found in all Douglas-fir forest age classes, but tend to be significantly more abundant in mature and old-growth forests (USDA and USDI 1996). In younger forests, nests typically are located along the tree boles just above a whorl of branches. In older forests, nests are in the outer edges of large lateral branches. Canopy continuity in stand ages >40 years appears to be the key habitat feature for this species.

The analysis area is within the range of this species, and approximately 44% (stands age >40 years) is suitable habitat. There are no documented observations of red tree voles, however, a spotted owl pellet analysis conducted in 1995 revealed RTV bones in samples taken at several known owl sites (survey on file at Coos Bay District office).

Del Norte Salamander

The analysis area falls within the 25 mile-radius of the northernmost Del Norte salamander (*Plethodon elongatus*) location, therefore surveys will be required prior to ground-disturbing activities. No surveys have been conducted within the watershed at this time. Surveys conducted for this species within Big Creek and Sandy Creek subwatersheds (immediately to the south) have not located any Del Norte salamanders.

Del Norte salamanders are found primarily in forested (mixed conifer-hardwood) talus habitats. Suitable habitats include deep cobble-sized talus with interstitial spaces sufficient to allow them to retreat far below the surface rock to escape temperature extremes and drying. In forested areas, they also can be found in surface duff or under rocks and shed bark. They also may be located where deep talus is abundant although canopy cover is lacking.

Species of local concern

Birds

Two Accipiter species (Northern Goshawk and Sharp-shinned hawks) have been observed in the watershed and are associated with a variety of forest types, age classes and conditions. Few surveys have been conducted for these species and there are no documented nest locations.

Primary cavity nesters such as Pileated, hairy and downy woodpeckers excavate cavities and forage on down logs and snags. The cavities they create provide nest and den sites and are a critical habitat component for secondary cavity nesters like screech owls, chickadees and small mammals such as flying squirrels.

Band-tailed pigeons use a variety of forest habitats and feed primarily on berries and nuts. They occur in low numbers and seem to have experienced a general population decline from the mid 1960s to the late 1980s (Jarvis and Passmore 1992). Declines throughout their range may be due to reduced forage, mineral sites, and nesting habitat; and increased pressure from agricultural interests and hunting on their winter ranges. There have been no formal surveys for this species conducted.

Neo-tropical migratory birds (NTMB) are species that breed in North America and spend their non-breeding period south of the United States. This includes most species of familiar bird groups such as the flycatchers, vireos, swallows, thrushes, warblers, and hummingbirds. They nest in a variety of forest age classes, some building nests in low shrubs while others nest high in the forest canopy. Long-term data is essential to the assessment of population trends, and as Andelman and Stock (1994) suggest, we lack the information needed to determine long-term population trends. For most species, we do not have information on specific micro-habitat features that effect reproductive success and/or survivorship during the breeding season.

Mustelids

American marten are uncommon here, and populations within the state probably are in decline due to habitat loss. Occasional sightings have been documented in the district over the past 10 years, however, their current abundance and distribution is unknown. Two sightings have been recorded in the watershed. Marten typically are associated with large, contiguous blocks of late-successional forests which contain abundant down logs and snags. Several studies have shown associations with down logs and riparian areas (for example, see Ruggiero *et al.* 1994). The analysis area contains a number of late-successional forest blocks (80+ year old) which may provide sufficient suitable habitat to support marten.

Beaver

Beaver is an example of a “keystone” species which affect many other species through habitat development. Beaver fall trees and store limbs of shrubs and trees in streams providing habitat for many vertebrate and invertebrate aquatic species. In larger streams, they build lodges against the bank, into which tunnels are dug (Verts and Carraway 1998). In smaller streams (where water flow is not too great) their dams also pool water, creating aquatic habitats that expand shorelines, promoting habitats for avian species. Pooling water also creates watering sites for large mammals, supports wetland vegetation for many small mammals and in some areas may be the only available fresh water source during periods of low flow. Available beaver habitat is related to the presence and health of riparian areas.

Beaver are shot or trapped by the government animal damage control agents or private land owners to limit the amount of flooding of agriculture land. There is no recognized management plan for beaver other than to eliminate animals in problem areas. There are recorded observations of beaver in the analysis area, but no inventories have been conducted to date.

Amphibians

Dunn's Salamanders, Southern Torrent Salamanders and Tailed Frogs are considered riparian associates, spending a portion of their life-cycle in streams or seeps as well as occupying adjacent up-slope habitats. There are general statewide range maps and general natural histories of species to describe habitat areas. No intensive inventories have been conducted, so little detailed information is available. Spot checks and random “grab” sampling has confirmed that there is a variety of herptiles in the watershed; however there is a poor understanding of their population densities, distributions and trends.

SYNTHESIS AND INTERPRETATION

ANALYSIS QUESTION V.3.2

How do plant and animal species influence ecosystem processes?

Many species groups (arthropods, fungi, lichens, and bryophytes) (Rhoades 1995) or in some cases individual species (such as beaver and cavity nesters) have important ecological roles in ecosystem processes.

Arthropods associate with a variety of forest layers and structures. Arthropods have critical roles in ecosystem function such as nutrient cycling, foundation of terrestrial food webs and in some cases help create structures (snags) suitable for other vertebrate species.

Beaver provide flood control, large complex pools, channel complexity, alcoves, and certain riparian vegetation important for aquatic and riparian species.

Cavity nesters provide nest and den sites and are a critical habitat component for secondary cavity nesters like screech owls, chickadees and small mammals.

Vascular plants are the largest and most dominant organisms in forested conditions and function as the primary producers, which form the foundation of food webs. They provide the substrates and habitats for other organisms; influence microclimate; and provide forage, hiding and thermal cover for many animal species.

Fungi profoundly affect nearly all ecological processes and events, either directly or indirectly, which occur in temperate coniferous forest ecosystems (Trappe and Luoma 1992). The ecological roles of fungi are diverse and appear to be important in the stabilization and maintenance of coniferous forest ecosystems. Ecological roles that these species play include; mycorrhizal associations with all conifers and many other vascular plant species, nutrient cycling (decomposers), soil aggregation, food webs, and diseases.

Bryophytes play important roles in maintenance of ecosystem stability. The most important roles these species have are in nutrient cycling and functioning as hydrologic buffers. Other roles that bryophytes have include; providing food and habitat for many invertebrates and vertebrates, maintenance of forest stream ecosystems, maintaining soil stability and providing a seed bed for many plant species.

Lichens contribute to:

- forest nutrient cycling,
- water retention (via precipitation and fog interception),
- providing organic matter for other organisms (through litterfall),
- increasing soil moisture holding capacity,

- providing a food source for many invertebrate and vertebrate species, and
- providing nesting material for myriad bird species.

ANALYSIS QUESTION V.3.3

How have management activities interacted with natural processes to change the abundance, distribution and movements of these species or the character of their habitats?

Past BLM land management practices most likely have altered species composition and their habitats over time. Impacts include: fragmentation and loss or change to key habitat components due to harvest activities; alteration of disturbance regimes (most importantly fire suppression); disturbance or harassment during critical life functions such as reproduction, rearing, etc.; and, introduction of exotic species. In many cases past management practices have favored generalist species. Fragmentation has increased the edge to interior habitat ratio. Therefore, species requiring large home ranges (i.e., northern spotted owl) have experienced a decrease in functional [interior] habitat. Fire suppression has prevented maintenance of disturbance-dependent habitats, such as meadows, and also reduced snag creation. Ground-disturbing activities and accompanying noise may harass species during critical life functions causing reproductive failures, etc. Exotic plant species have the ability to out-compete native plant species, which may result in a reduction of habitat quality for species dependent on native vegetation.

Species requiring old-growth forest habitats, or key habitat components (snags, complex tree canopies, down logs, etc.) have been most affected. Populations of these plant and animal species have declined dramatically, and many are restricted to small isolated habitat islands. The small size and isolation of these populations put these species and ecological communities at risk (Noss and Cooperrider 1994).

ANALYSIS QUESTION V.3.4

What are the objectives for species of management concern on Federal lands?

One of the major goals identified in both the NWFP (USDA and USDI 1994) and the District RMP (USDI 1995a) is to protect, maintain and restore the native wildlife habitats, biological communities and ecological functions to federally managed forest lands. Due to the large number of native plants and animals, and the limited understanding of their ecology and habitat requirements, managing forests to provide habitat on a species by species basis would be ineffective (Marcot *et al.* 1994). Instead, forest management should focus on emulating the habitat patterns and ecological processes which created and maintained the natural forest landscape.

Given the current political and social environment, fully emulating all the characteristics and ecological processes of the natural forests is not feasible. For example, reintroducing large-scale catastrophic fires would present an unacceptable threat to homes and private property. However, by implementing standards and guidelines, many key habitat components found in undisturbed ecosystems can persist in managed forest stands.

The general management objectives for species of concern are:

- to prevent local extirpation and contribute to recovery of special status species and other species at risk, and
- to maintain or restore a landscape conducive to movement of individuals among habitat patches.

Threatened and Endangered Species

Management objectives for threatened and endangered species are outlined in the BLM Manual 6840.06(A). The major objectives are:

1. Conserve T&E species and the ecosystems on which they depend.
2. Ensure that all actions authorized, funded, or carried out by the BLM are in compliance with the ESA.
3. Cooperate with the FWS/NMFS in planning and providing for the recovery of T&E species.
4. Retain in Federal ownership all habitat essential for the survival or recovery of any T&E species, including habitat used historically by these species.

Each of these four species (the Marbled Murrelet, Northern Spotted Owl, Peregrine Falcon and the Bald Eagle) have a Recovery Plan that outlines specific goals. Typically, the main objectives of these plans are to outline steps that will provide secure habitats and increase populations to levels where it may be possible to delist the species.

Special Status Species (Not Federally Listed)

The management objective for special status species is to ensure that actions authorized on BLM-administered lands do not contribute to the need to list special status species under provisions of the Endangered Species Act (BLM Manual – Section 6840).

Survey and Manage/Protection Buffer Species

The management objective for Survey and Manage/Protection Buffer species is to maintain their viability, at both site-specific and range-wide scales. The appropriate protocols will be applied during project planning so as not to impact species viability.

Fungi

- Survey areas across land allocations to determine distribution and abundance of these species across the landscape.
- Since any new location of a Survey and Manage Component 1 fungi will be the first for the watershed (and district) these locations should be managed according to the Fungi Management Recommendations, which typically means to not change the current habitat conditions (shade, temperature, substrate, relative humidity, etc.).

- Maintain ample supplies of down wood as well as a distribution of all decay classes across the landscape to the extent possible.
- Leave at least a minimum of 15% green trees in regeneration harvest units in clumps (these clumps could be focused in areas with concentrations of down wood).

Lichens/Bryophytes

- Conduct inventories other land use allocations to develop understanding of distribution and abundance of lichen species.
- Maintain well-distributed patches and individual green trees within harvest units. These trees should be retained over several rotations. Trees considered for retention should have a high diversity of structure, such as those trees that are leaning, with asymmetrical crowns and large lateral branches will provide more substrate availability for lichens (and bryophytes).
- Maintain ample supplies of down wood as well as a distribution of all decay classes across the landscape to the extent possible.
- Manage newly discovered locations to maintain the existing habitat conditions.
- Retain hardwoods, especially bigleaf maple, for those species dependent on these substrates.

Mollusks

- Manage known sites to maintain local and range wide viability of those species. This may include a variety of management options based on species, number of locations found, amount of adjacent areas surveys (particularly reserve areas).
- Survey reserve areas to determine abundance and distribution of these species across the landscape. If locations are found within reserve areas these will provide flexibility in managing those sites located within project areas.
- Retain hardwoods, especially bigleaf maple, for those species that are dependent on their litter fall.
- Maintain well-distributed patches and individual green trees within harvest units. These trees should be retained over several rotations.
- Survey riparian reserves before any adjustments are proposed. Maintain existing riparian reserve widths in areas where these species are found.
- Maintain ample supplies of down wood as well as a distribution of all decay classes across the landscape to the extent possible. Make sure that at least 80% of these areas maintain the current microclimate conditions to prevent logs from drying out.

Red Tree Vole

The management objective for Survey and Manage/Protection Buffer species is to maintain their viability, at both site-specific and range-wide scales. The appropriate protocols will be applied during project planning so as not to impact species viability.

Amphibian (Del Norte salamander)

The management objective for Survey and Manage/Protection Buffer species is to maintain their viability, at both site-specific and range-wide scales. The appropriate protocols will be applied during project planning so as not to impact species viability.

Species of Local Concern

The objective is to ascertain their status and determine appropriate management responses, based on analysis of these data.

V.4 - NON-NATIVE PEST SPECIES

PORT-ORFORD-CEDAR ROOT ROT

REFERENCE CONDITIONS

Port-Orford-cedar (POC) (*Chamaecyparis lawsoniana*) is native to the analysis area and at the northern extent of its range (Burns and Honkala 1990a: Figure 1). Timber stands north of the East Fork Coquille River average ≤1% POC, compared to stands south of the East Fork Coquille River, which average 8% POC in trees/acre. The analysis area incorporates approximately 2.5-5.0% of the total range of POC.

The amount of POC is low, averaging 4.6% trees/acre for the entire watershed and only one percent of the total stems in timber stands ≤40 years old. POC exists primarily as an intermediate to overtopped tree in the overstory and occasionally as seedlings in the understory.

Port-Orford-cedar root rot, *Phytophthora lateralis* (PL), was introduced unintentionally in the Pacific northwest as early as 1923. Seedlings infected with this fungal disease can succumb within a few weeks; large trees may live up to five years. After infection, resting spores survive at least seven years in the root system of a dead host. The spread of PL generally is limited to wet or moist soil conditions. During dry conditions, the prevalent type of spores (resting spores) are not infectious and are not easily transported. Zoospores are infectious, but cannot survive temperatures greater than 20° C. They also will not survive indefinitely in the soil without a host.

The spread of the disease is influenced by natural events and human activities. The fungal spores are mobilized by water (natural infiltration or erosion) which rapidly spreads the infection downstream. Spores can also be moved in mud carried about by wildlife, construction equipment, vehicles, humans, and domestic animals.

CURRENT CONDITIONS

ANALYSIS QUESTION V.4.1

What is the current distribution and level of infestation of Port-Orford-cedar root rot?

Systematic surveys to identify disease locations adjacent to roads (within 50 ft.) in the Myrtlewood Resource Area was completed June 1997. Additional aerial photo reconnaissance of the general landscape was completed April 1998. Maps detailing infected locations based on these surveys are available at the BLM office.

There are 32 infection sites totaling ≅51 ac on BLM-administered lands and 18 infections totaling 65 ac on private lands in the watershed outside of the roadside survey area. Only two infection sites were found north of the East Fork Coquille River, both in T28S, R11W, Section 11, for a total of 16 ac. Tractor logging in the 1940s may have been responsible for this infection. Eight sections south of the East Fork Coquille River contain PL infections totaling 35 ac.

Areas not showing infection now may show symptoms as the disease progresses in infected trees. Infection sites are mainly along roads, old skid trails, riparian areas adjacent to roads, and POC trees that have had boughs harvested.

SYNTHESIS AND INTERPRETATION

ANALYSIS QUESTION V.4.2

What is the potential for continued introduction and spread of the disease?

Low Risk and High Risk PL Infection Sites

A 'Low Risk/High Risk Site' analysis approach was designed as a means of evaluating effects of PL on POC populations and maintaining the population viability of POC. This strategy is described in Zobel *et al.* (1985). Under 'General Guidelines for Future Management' (p. 132), this document states:

> Concentrate cedar production as high above and as far from infection sources without unreasonably limiting the amount of growing stock. Concentrations of cedar should be on high ground and well away from roads. The ratio of cedar to other species should decrease close to roads and on more gentle slopes.

High Risk Sites

High Risk sites are areas within 50 ft. of all roads and streams. Along roads, the majority of PL infections have been identified within the first 30 ft. of adjacent stands. The extra 20 ft. is for additional protection along these edges. The distance from stream edges is based on the root width of an average POC tree in a 49 year old, 90% pure POC stand [this distance is 6.7 m or 22' (Gordon 1974; Gordon and Roth 1976)]. An additional 28 ft. distance is added to the root width to buffer the area that may come in direct contact with PL spores in stream channels. This concept is further supported by Zobel *et al.* (1985), which states on page 135: "Where water is the only probable means of disease spread, the shift to higher ground need be no more than 15 meters (49 feet) ..." for POC.

PL spores from initial infection sites adjacent to streams or free standing water can spread at ½ mi. per year (Goheen 1997). Humans, animals, equipment, and vehicles can introduce infected

soil to areas adjacent to roads. It should be noted that potential spread of PL by off-highway vehicles (OHVs) is typically limited to active or abandoned roads and trails.

Low Risk Sites

Low Risk Sites comprise 79% of the analysis area acreage (all ownerships). Public and private lands have a similar proportion of Low Risk acreage; 80% of the BLM-administered land base versus 78% of private ownership.

Rate of infection spread is very slow across- or up-slope, occurring at one tree/year from the initial site (Goheen 1997). In these directions, root contact (or grafting) between POC trees is the primary mechanism of spread. Spread of the disease by root grafting in mixed species stands is not a significant feature in the overall disease spread pattern (Gordon 1974). Because the analysis area is composed of mixed species stands with POC as a minor component (4.6%), infections in Low Risk Sites are not likely to spread. This indicates there will continue to be a viable population of POC in the watershed.

Risk of PL spreading uphill or downhill from roads is very low if all POC > 1" diameter has been removed within 25-30 ft. of roads (Goheen 1997).

ANALYSIS QUESTION V.4.3

What ecological processes would be altered should Port-Orford-cedar be lost, or populations greatly reduced?

It is unlikely that PL will result in the extirpation of POC. Even in areas of heavy disease occurrence, such as roadsides and private land, POC continues to exist. POC is a prolific seeder and produces seeds early, between 5 and 9 years of age. POC produces seed every year with heavy seed crops every 4 or 5 years. Some POC exhibits a degree of resistance to the disease.

Populations levels in the East Fork are not likely to be greatly reduced due the following:

- the relatively low level of infections in Low Risk sites;
- the low percent of POC in timber stands (root grafting is not likely to occur);
- the prolific seeding of the species; and,
- future management actions including: roadside sanitation, dry season operations, surfacing of roads, cleaning of equipment prior to entry into the area, thinnings, and planting of POC in Low Risk Sites.

ANALYSIS QUESTION V.4.4

What are the management objectives for control of Port-Orford-cedar disease on Federal lands?

The basic strategy for POC management on Federal lands in the East Fork watershed is:

- to manage Low Risk Sites for the long term POC population viability;
- to limit the spread of PL within the High Risk Sites; and,
- to prevent disease movement into Low Risk areas.

Design features and mitigation consist of active treatments on the High Risk Sites (i.e., roads and streams) and passive management of Low Risk Sites across the landscape. This strategy should work well in this basin, as POC is scattered and well distributed in stands away from streams and roads.

NOXIOUS WEEDS

CURRENT CONDITIONS

ANALYSIS QUESTION V.4.5

What is the current status of noxious weed spread?

Noxious weeds [scotch broom (*Cytisus scoparius*), french broom (*Genista monospessulana*), and gorse (*Ulex europaea*)] are known throughout the watershed, but with a few exceptions are generally scattered in relatively small (<200 individuals) isolated occurrences. However, there are a few locations of scotch broom with well over 1,000 individuals. Other noxious weeds (Canada thistle, Klamath weed, tansy ragwort, bull thistle) also are present but:

(1) are not in sufficient numbers to be of management concern;
(2) are managed through biological control efforts, or;
(3) are not expected to increase significantly.

All of these locations are along roads or in adjacent disturbed areas. Gorse locations can be directly attributed to contaminated equipment. The majority of the road systems were inventoried for weeds in 1997, and most inventoried BLM locations of french broom were hand treated in 1998.

SYNTHESIS AND INTERPRETATION

ANALYSIS QUESTION V.4.6

What is the ecological impact of noxious weeds?

Noxious weeds have the ability to overtake and eliminate native vegetation by competing for water, sunlight, nutrients, and physical space. The broom species and gorse have the ability to fix nitrogen and are able to establish on nutrient-poor sites. This adaptation gives these

species an ecological advantage over most native species. Indirectly, these species can impact wildlife by creating less desirable forage and reducing habitat quality. It appears that only a few generalist wildlife species utilize noxious weeds.

Noxious weed species have seeds that are able to remain dormant in the soil up to 80 years. If rotations of activity are short enough, weed species will re-invade areas with increased density following surface disturbance (natural or human caused) events.

ANALYSIS QUESTION V.4.7

What is the potential for the spread and greater impact of noxious weeds?

The analysis area is treatable, but needs immediate attention to prevent further spread and degradation of the watershed by increased populations of invasive non-native species. Current populations and frequency distribution indicate a significant number of satellite weed communities and a few locations at epidemic levels. This pattern indicates that future epidemic spread should be expected from the current satellite communities.

ANALYSIS QUESTION V.4.8

What are the management objectives concerning noxious weeds on Federal lands?

The management objectives are:

- Maintain a “no weed” tolerance policy on all facilities or developed sites.
- Treat and manage current populations at levels below management concern (such as with tansy ragwort or Klamath weed).
- Ensure program actions do not cause or contribute to the spread of these species by changing behavior through standard weed prevention activities and awareness.
- Immediately suppress and/or eliminate future outbreaks through an integrated management program composed of prevention, detection, control (manual, mechanical, chemical, biological), and education.
- Restore disturbance sites by implementing a native species program which reduces the risk of re-infestation.